2022 - 23

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CLASS 10

Please fill the following details immediately

Name _____

Hall Ticket No._____

Questions : 60   **Time : 60 minutes**

INSTRUCTIONS

Read all instructions carefully before attempting any question.

- Ensure that the 'Class' printed here and inside, is the same as the test you are appearing for.
- You must complete the paper within the time allotted.
- Do not open this question paper until you are permitted to.
- You are not allowed to use a calculator.
- Figures herein are not to scale. Hence, you cannot depend on the estimate of size or measurement. Use your knowledge of the subject.
- Rough work shall be carried out only in the space provided for the same throughout this booklet. No separate sheets are allowed for the same.
- Return your answer sheet to the invigilator soon after completion and before leaving the examination hall. Take the question paper with you.
- There is no negative marking.
- Results would be made available on **www.unifiedcouncil.com**

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01 If $\cot \theta = \dfrac{63}{16}$, then choose the value of ($\sin\theta + \cos\theta$)

(A) 1   (B) $\dfrac{69}{65}$ (C) $\dfrac{79}{65}$ (D) 2

02 What is the value of

$(\sin^2 6° + \sin^2 12° + \sin^2 18° + \ldots\ldots\ldots + \sin^2 90°)$?

(A) 1   (B) 7   (C) 9   (D) 8

03 ABC is an equilateral triangle and AP⊥BC. 'D' lies on BC such that BD:DC = 2:1. If AB = 9cm, then select the measure of AD.

(A) $2\sqrt{7}$ cm   (B) $3\sqrt{7}$ cm

(C) $4\sqrt{11}$ cm   (D) $7\sqrt{7}$ cm

04 What is the simplest value of

$$\left\{ \frac{\cos^2(45°+\theta)+\cos^2(45°-\theta)}{\tan(60°+\theta)\tan(30°-\theta)} \right\} ?$$

(A) $\dfrac{1}{2}$ (B) 1   (C) 2   (D) $\dfrac{3}{2}$

Space for rough work

08 Choose the zero of $(x^3 - 9x^2 - 69x + 5)$.

(A) $(5 - 4\sqrt{3})$

(B) $(5 + 4\sqrt{3})$

(C) $(7 - 4\sqrt{3})$

(D) 5

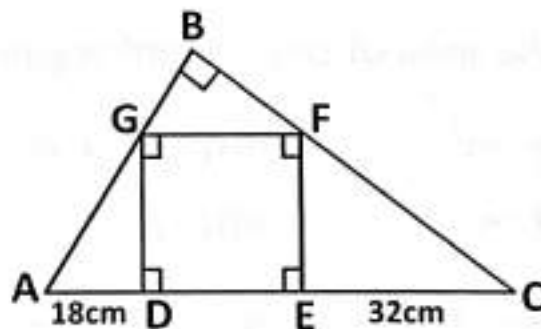**09** Choose the 10th term of this progression

$\sqrt{18}$, $\sqrt{32}$, $\sqrt{50}$ ....

(A) $\sqrt{242}$ (B) $\sqrt{288}$ (C) $\sqrt{338}$ (D) $\sqrt{392}$

10 The linear equations $3x + 4y = 5$ and $0.06x + 0.08y + 0.1 = 0$ have _____.

(A) exactly one solution

(B) exactly two solutions

(C) More than two solutions

(D) No solution

11 In the given figure. $\triangle ABC$ is right angled at B. DEFG is a square, AD = 18 cm and CE = 32 cm, then what is DE ?
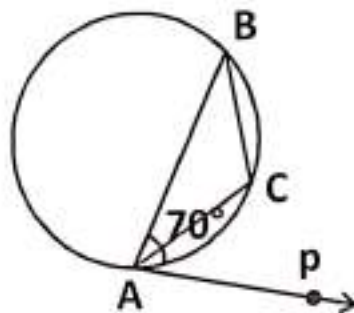

(A) 18 cm

(B) 32 cm

(C) 16 cm

(D) 24 cm

12 If D(5, −3), E(−5, 3) and F(6, 6) are the mid points of AB, BC & CA respectively of $\triangle ABC$. What is the centroid of $\triangle ABC$?

(A) (3, 3)   (B) (2, 2)   (C) (4, 5)   (D) (−4, 5)

13 In the figure if AB is a chord of a circle and PA tangent to the circle, $\angle PAB = 70°$, then choose the measure of $\angle BCA$.

(A) 70°   (B) 110°   (C) 65°   (D) 125°

14 4 identical semicircles are drawn inside a big square as shown. Each side of the big square is 14 cm long.
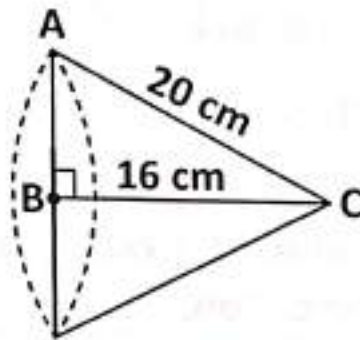

14 cm
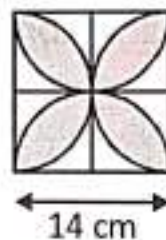
Select the area of the shaded region. (Use $\pi = \dfrac{22}{7}$)

(A) 125 cm²   (B) 112 cm²

(C) 173 cm²   (D) 159 cm²

Space for rough work

15 A right-angled triangle ABC, where ∠B = 90°, is rotated about BC. If BC = 16 cm and AC = 20 cm, find the volume of the right circular cone traced out by the triangle. (Use $\pi = \dfrac{22}{7}$)

A
20 cm
16 cm
B
C

(A) 2413.7 cm³   (B) 2311.4 cm³

(C) 1254.6 cm³   (D) 1725 cm³

16 What is the image of the point (–3, –5) with respect Y-axis ?

(A) (3, 5)   (B) (–3, 5)

(C) (–6, –5)   (D) (3, –5)

17 Choose the least number of square tiles required to pave the floor of a rectangular room 19.27 meters long and 17.63 meters broad.

(A) 41   (B) 2022   (C) 2021   (D) 2023

Space for rough work

18 Choose the value of k such that the polynomial $x^2 - x(k + 4) + 2(2k + 1)$ has sum of its zeros equal to half of their product

(A) 3   (B) 2   (C) 4   (D) 7

19 If $1 + \sin^2 \theta = 3\sin \theta \cos \theta$, then choose the measure of 'θ'

(A) 90°   (B) 60°   (C) 45°   (D) 30°

20 In an arithmetic progression if 18th term is 18, then what is the sum of first 35 terms of the same arithmetic progression.

(A) 545   (B) 630

(C) 735   (D) can't be determined

21 Choose the HCF of $18(6x^4 + x^3 - x^2)$ and $45(2x^6 + 3x^5 + x^4)$

(A) $9x^2(2x + 1)$ (B) $x^2(2x - 1)$

(C) 9   (D) $x^2(4x^2 - 1)$

Space for rough work

22 If $0° < \theta < 90°$ and $\dfrac{\cos^2\theta - 3\cos\theta + 2}{\sin^2\theta} = 1$, then select the measure of 'θ'.

(A) 0°   (B) 30°   (C) 45°   (D) 60°

23 The sum of two numbers is 1000 and the difference between their squares is 256000. Choose the greater number in the given numbers

(A) 744   (B) 749   (C) 628   (D) 694

24 The perimeter of a rectangular room is 98 meters and the length of a diagonal is 41 meters. Choose its length.

(A) 40 meters   (B) 39 meters

(C) 37 meters   (D) 35 meters

25 Which term of the arithmetic progression

$23, 22\dfrac{1}{4}, 21\dfrac{1}{2}, 20\dfrac{3}{4}, 20......$ is the first negative term ?

(A) 28   (B) 29   (C) 30   (D) 32

Space for rough work

Class : 10   *Physics*

26 Two copper wires A and B of the same diameter have lengths 3 cm and 5 cm respectively. R_A and R_B are the resistance of A and B and ρ_A and ρ_B are the resistivities respectively. Identify the correct statement from the following:

(A) $R_A > R_B, \rho_A > \rho_B$

(B) $R_B > R_A, \rho_A > \rho_B$

(C) $R_A > R_B, \rho_A < \rho_B$

(D) $R_A < R_B, \rho_A = \rho_B$

27 A convex lens of focal length f is placed some where in between an object and a screen. The distance between object and screen is x. If numerical value of magnification produced by lens is m, focal length of lens is

(A) $\dfrac{mx}{(m+1)^2}$

(B) $\dfrac{mx}{(m-1)^2}$

(C) $\dfrac{(m+1)^2}{m}x$

(D) $\dfrac{(m-1)^2}{m}x$

28 A man's near point is 0.5 m and far point is 3 m. Power of spectacle lenses required for (i) reading purposes, (ii) seeing distant objects, respectively, are

(A) -2 D and $+3$ D

(B) $+2$ D and -3 D

(C) $+2$ D and -0.33 D

(D) -2 D and $+0.33$ D

Space for rough work

8   *Paper Code : UN487*   OLYMPIADS
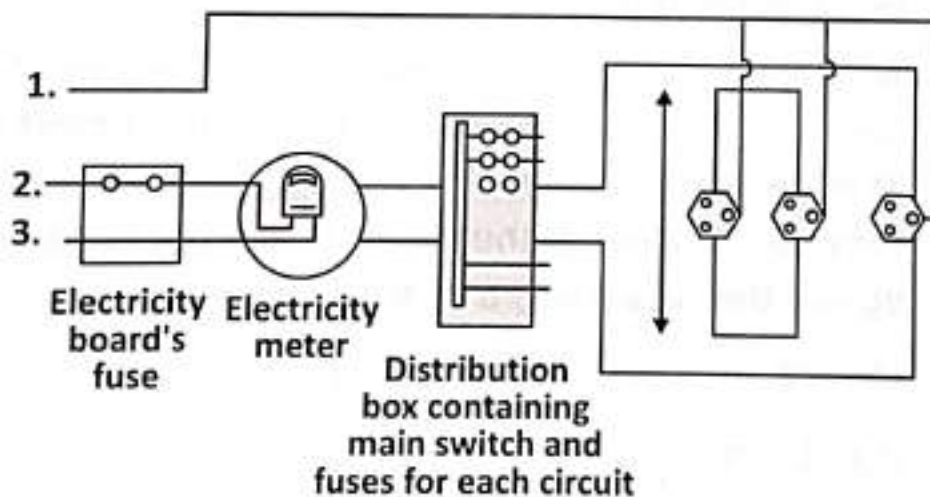
29 A light ray enters from medium P to medium Q as shown below.
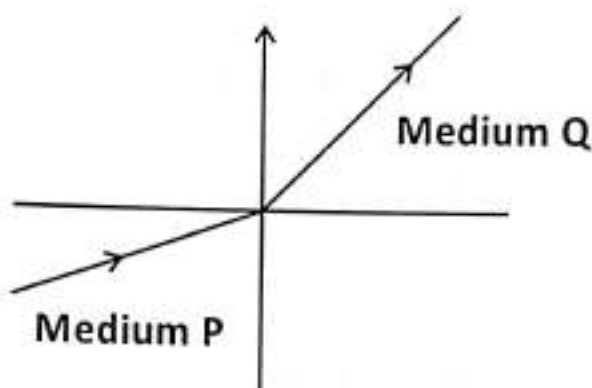
The refractive index of medium Q relative to medium P will be

(A) Greater than unity   (B) Less than unity

(C) Equal to unity   (D) Zero

30 A schematic diagram of one of the common domestic electric circuit is shown below.

Electricity board's fuse   Electricity meter   Distribution box containing main switch and fuses for each circuit

Identify the types of wires 1, 2 and 3 respectively.

(A) 1-Live wire, 2-Neutral wire, 3-Earth wire

(B) 1-Earth wire, 2-Live wire, 3-Neutral wire

(C) 1-Earth wire, 2-Neutral wire, 3-Live wire

(D) 1-Neutral wire, 2-Live wire, 3-Earth wire

31 Read the statements given below.

> I. Colour of eye is determined by the colour of iris.
>
> II. Eye lens forms an inverted image of an object on the retina.
>
> III. Myopia and long-sightedness are the same eye defects.
>
> IV. Iris is a transparent spherical membrane which covers the front of the eye.
>
> V. Cornea is responsible for the refraction of light into the eye and focusing them on retina to create an image.

Identify only correct statements.

(A) I, III and IV only

(B) II, III and V only

(C) I, II and V only

(D) III, IV and V only

32 An object is kept at a distance of 16 cm from a thin lens and the image formed is real. If the object is kept at a distance of 6 cm from the same lens, the image formed is virtual. If the sizes of the images formed are equal, the focal length of the lens will be

(A) 21 cm

(B) 11 cm

(C) 15 cm

(D) 17 cm

Space for rough work

33 Read the statements given below.

I. In electromagnetic induction, the induced current is maximum when the direction of motion of coil is perpendicular to the magnetic field.

II. An AC generator can be converted into DC generator by replacing split ring commutator with slip ring commutator.

III. A direct current does not change its directon with time.

IV. In India, AC changes its direction after every 1/50 s.

V. AC can be transmitted over a long distances without much loss of energy but DC current cannot.

Identify both true and false statements.

	Statements	
	True	False
(A)	III, V	I, II, IV
(B)	I, V	II, III, IV
(C)	I, III, V	II, IV
(D)	I, II, V	III, IV

34 A ray of light is incident at 60° on one face of a prism which has angle 30°. The angle between the emergent ray and incident ray is 30°. What is the angle between the ray and the face from which it emerges ?

(A) 0°

(B) 30°

(C) 60°

(D) 90°

35 An electric lamp, whose resistance is 20 Ω and a conductor of 4 Ω resistance are connected to a 6 V battery as shown below.
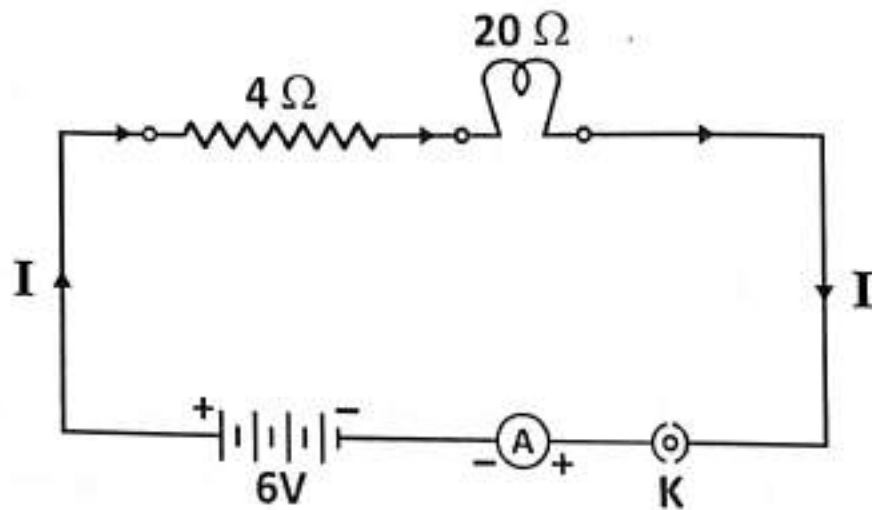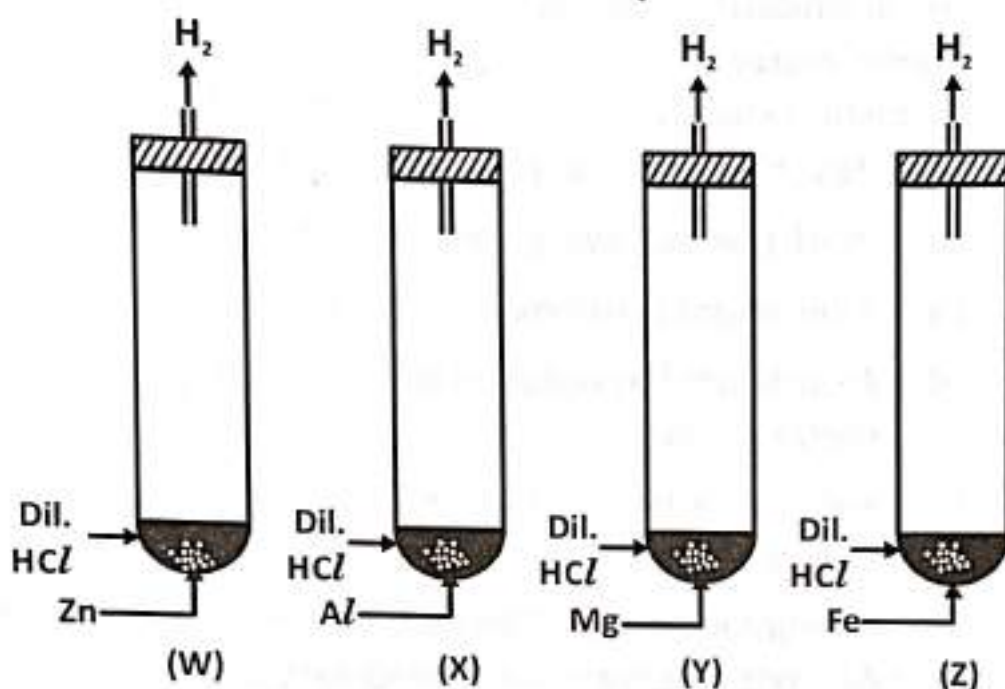

Find the total resistance of the circuit, the current through the circuit and the potential difference across the electric lamp and the conductor.

	Total Resistance (R_s) (Ω)	Current (I) (A)	Potential Difference (Volts)	
			V_1 Lamp	V_2 Conductor
(A)	38	0.64	4	7
(B)	45	0.93	3	5
(C)	24	0.25	5	1
(D)	56	1.65	6	3

Space for rough work

OLYMPIADS

36 Observe the experimental setup shown below carefully.

(W)　　　(X)　　　(Y)　　　(Z)

Identify the correct order of reactivity of the given metals with dil HCl.

(A) $Y > X > W > Z$

(B) $Y > W > X > Z$

(C) $Z > X > W > Y$

(D) $Z > W > X > Y$

37 A dry pellet of a common base Z when kept in the open, absorbs moisture and turns sticky. It is also a byproduct of chlor-alkali process. What is Z and what type of reaction occurs when it is treated with carbon dioxide ?

	Z	Type of reaction
(A)	Na_2CO_3	Neutralisation
(B)	Na_2CO_3	Substitution
(C)	$NaHCO_3$	Decomposition
(D)	$NaOH$	Neutralisation

38 Tarnished silverware can be cleaned by using aluminium and sodium carbonate salt.

An aluminium plate is placed in a plastic bucket with warm water and the salt is dissolved in it. When the tarnished silverware is placed in the mixture for a few minutes, the shine of the silverware is restored.

Which of the following best explains this method ?

(A) Aluminium is the oxidising agent in this reaction.

(B) Aluminium has reduced the silver compound to form metallic silver.

(C) Sodium carbonate has reduced the silver compound to form metallic silver.

(D) Aluminium and sodium carbonate has reacted to form Al^{3+} ions which are able to reduce the silver compound to form metallic silver.

39 Match the reactions in Column P with their types given in Column Q.

	Column P		Column Q
P	$CH_3CH_2CH_2OH + O_2 \xrightarrow[kMnO_4]{Alkaline} CH_3CH_2COOH$	I	Addition
Q	$CH_2{=}CH_2 + H_2 \xrightarrow{Ni} CH_3{-}CH_3$	II	Substitution
R	$CH_4 + Cl_2 \xrightarrow{Sunlight} CH_3Cl + HCl$	III	Combustion
S	$CH_4 + O_2 \longrightarrow CO_2 + H_2O$	IV	Oxidation

Identify a correct match.

(A) P-I, Q-II, R-III, S-IV   (B) P-I, Q-IV, R-II, S-III

(C) P-IV, Q-I, R-III, S-II   (D) P-IV, Q-I, R-II, S-III

40 Electricity is passed through an aqueous solution of sodium chloride (called brine) as per the given chemical equation.

$$NaCl\ (aq) \xrightarrow{\text{Electricity}} NaOH\ (aq) + X + Y$$
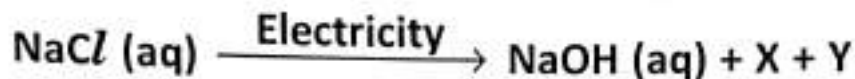
What are the products formed at X and Y and where are they produced ?

(A) $X = O_2$ at cathode $Y = Cl_2$ at anode

(B) $X = O_2$ at anode $Y = Cl_2$ at cathode

(C) $X = H_2$ at cathode $Y = Cl_2$ at anode

(D) $X = H_2$ at anode $Y = Cl_2$ at cathode

41 Identify a false statement.

(A) Gold and platinum are inert metals, so they exist in nature in their native state.

(B) Metals high in reactivity series are obtained by roasting and refining of the ore.

(C) In the conversion of copper oxide into copper metal, copper sulphide acts as a reductant.

(D) A mixture of iron oxide and aluminium is called thermite mixture and is used for joining railway tracks or cracked machine parts.

(Space for rough work)

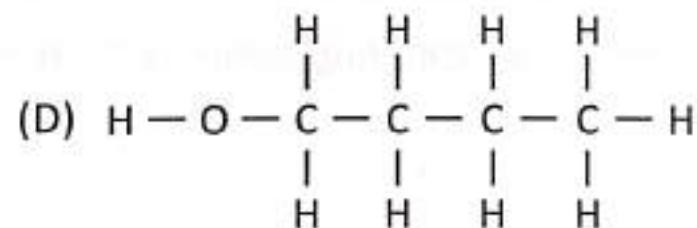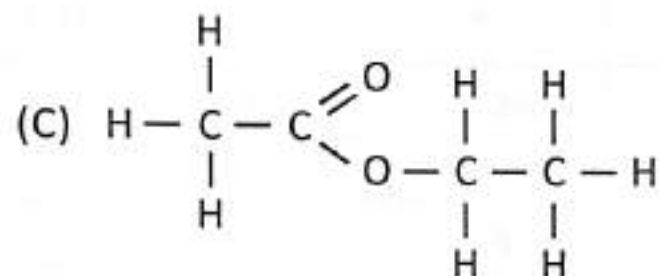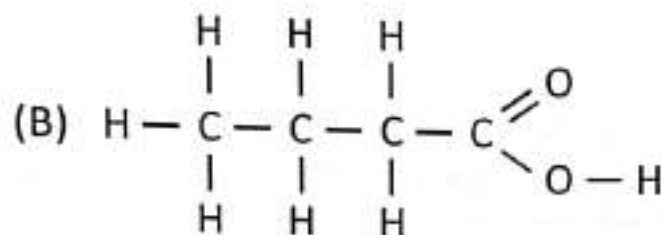**42** Match the reactants in Column-I with products formed in Column-II.

	Column-I (Reactants)		Column-II (Major product)
P.	$2Mg + O_2$	(i)	$CaCO_3 + H_2O$
Q.	$.Ca(OH) + CO_2$	(ii)	$2Fe_2O_3.xH_2O$
R.	$Zn + FeSO_4$	(iii)	$2MgO$
S.	$4Fe + 3O_2 + 2H_2O$	(iv)	$ZnSO_4 + Fe$
		(v)	$Mg(OH)_2$
		(vi)	$Fe(OH)_2$

Identify a correct match.

(A) P-(ii), Q-(i), R-(v), S-(vi)

(B) P-(iii), Q-(i), R-(iv), S-(ii)

(C) P-(vi), Q-(iii), R-(iv), S-(v)

(D) P-(iii), Q-(iv), R-(v), S-(ii)

Space for rough work

Paper Code : UN487

OLYMPIADS

43 Which of the structures shown below of a compound reacts with ethanol to form a sweet smelling liquid ?

(A)

$$\underset{H}{\overset{H}{\diagdown}} C = C \underset{H}{\overset{H}{\diagup}}$$

(B)

H — C — C — C — C with H, H, H above and H, H, H below, and =O and O—H on the carboxyl

(C)

H — C — C (=O) — O — C — C — H with H above/below and H, H on the ethyl groups

(D) H — O — C — C — C — C — H with H, H, H, H above and H, H, H, H below
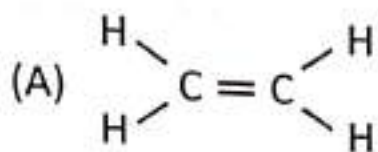
44 The correct increasing order of pH of given salts is

(A) Blue vitriol < Common salt < Baking soda < Washing soda

(B) Blue vitriol < Common salt < Washing soda < Baking soda

(C) Washing soda < Baking soda < Common salt < Blue vitriol

(D) All of the above

45 An experiment was carried out to determine the position of the metals : P, Q, R and S in the reactivity series. The results of the displacement reactions are shown below.

Metals	AgNO$_3$ (aq)	Pb (NO$_3$)$_2$ (aq)	FeSO$_4$ (aq)	MgSO$_4$ (aq)
P	—	No reaction	No reaction	No reaction
Q	Silver is displaced	—	No reaction	No reaction
R	Silver is displaced	Lead is displaced	Iron is displaced	—
S	Silver is displaced	Lead is displaced	—	No reaction

Identify the metals in ascending order to form positive ions.

(A) P, Q, R, S

(B) P, Q, S, R

(C) Q, R, S, P

(D) R, S, Q, P

Space for rough work

46 Which option correctly depicts the dental formula of a human adult ?

(A) $\frac{2112}{2112} \times 2$

(B) $\frac{2102}{2102} \times 2$

(C) $\frac{2123}{2123} \times 2$

(D) $\frac{2111}{2111} \times 2$

47 Match the following parts of digestive system in column I to their functions in column II and select the correct option.

	Column I		Column II
(P)	Oesophagus	(i)	Regulates most chemical levels in the blood
(Q)	Gall bladder	(ii)	Mixes and churns the food that contain gastric juices
(R)	Liver	(iii)	Swallows the chewed food mixed with saliva
(S)	Stomach	(iv)	Store bile which mixes with the fat in food

(A) P - i; Q - ii; R - iii; S - iv

(B) P - iii; Q - i; R - iv; S - ii

(C) P - ii; Q - iii; R - i; S - iv

(D) P - iii; Q - iv; R - i; S - ii

Space for rough work

48 Which of the following contributes most to transport of water from the ground to the top leaves of a tall tree ?

(A) ATP is not required

(B) Capillary rise of water in Pholem

(C) Cohesion of water and transpiration pull

(D) All of these

49 Which of the following are the functions of pituitary gland ?

(A) It stimulates the adrenal gland to secrete cortisol.

(B) It produces oxytocin.

(C) It also secretes prolactin, which stimulates the production of milk.

(D) All of these

50 Where does fertilization occur in human females ?

(A) Uterus   (B) Cervix

(C) Ovary   (D) Fallopian tube

51 Identify the sex chromosomes in human males and females.

	Males	Females
(A)	XX	XX
(B)	XY	XY
(C)	XX	XY
(D)	XY	XX

Space for rough work

Paper Code : UN487

OLYMPIADS

52 Which of these protects the brain from Mechanical Shocks ?

(A) Piameter: It is inner thin and vascular layer.

(B) Arachnoid membrane: It is the middle, thinand vascular layer.

(C) Durameter: It is the outer, thick, and fibrous layer.

(D) Cerebrospinal fluid

53 Which of these induces dormancy ?

(A) Auxin   (B) Abscisic acid

(C) Ethylene   (D) Cytokinesis

54 Which of the following is not a growth dependent response ?

(A) Movement of roots towards gravity

(B) Movement of tendrils of pea plant

(C) Movement of shoots towards light

(D) Drooping of touch-me-not leaves

55 Identify the enzyme of saliva, that helps break down of starch.

(A) Ptyalin   (B) Renin
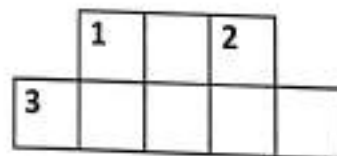
(C) Lipase   (D) Trypsin

Space for rough work

56 A solid sphere is kept on a planar surface. Parallel rays of light are falling on it as shown in the image. Which option correctly represents the shadow cast by the sphere on the planar surface ?

Light Rays

Planar surface

Sphere
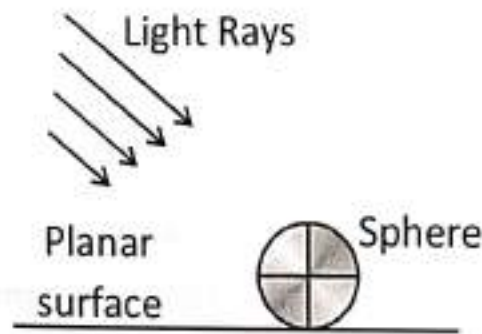
(A)

(B)

(C)

(D)

57 What is the sum of the digits in the completed cross number ?

	1		2	
3				

Across
1. A cube
3. A power of 11

Down
2. A square

(A) 25

(B) 29

(C) 32

(D) 34

58 In each of these questions, two statements I & II are provided. These may have a cause and effect relationship or may have independent causes or be the effects of independent causes. Read the statements carefully and select the correct option.

Statement I: A proper safety measure is planned immediately to avoid any such incident in the future.

Statement II: The injured students have been taken to the nearest city hospital immediately.

(A) Statement I is the 'Cause' and the Statement II is the Effect.

(B) Statement II is the 'Cause' and the Statement I is the 'Effect'.

(C) Both Statements I and II are 'Effects' of independent 'Causes'.

(D) Both Statements I and II are 'Effects' of a common 'Cause'.

Space for rough work

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59 Fact 1: Geetha said, "Anu and I both have cats."

Fact 2: Anu said, "I don't have a cat."

Fact 3: Geetha always tells the truth, but Anu sometimes lies.

If the first three statements are facts, which of the following statements must also be a fact ?

I: Anu has a cat.

II: Geetha has a cat.

III: Anu is lying.

(A) I only

(B) II only

(C) I and II only

(D) All the statements are facts.

60 Which net corresponds to the given cube ?

(A)

(B)

(C)

(D)

Paper Code : UN487

OLYMPIADS